

REMARKS

Claims 1, 3-6, 8-11 and 13 are pending. By this Preliminary Amendment, Claim 2 is canceled without prejudice or disclaimer and Claims 1 and 3-4 are amended. Support for the amendments to Claim 1 is provided in Figures 3-4 as well as the corresponding description of the instant application, as originally filed. Claims 3-4 are amended merely to have proper dependency.

As such, Applicants respectfully submit that no new subject matter is presented.

Claim Rejections - 35 U.S.C. 103

The Final Office Action dated November 30, 2007 rejected Claims 1-6, 8 and 10-11 under 35 U.S.C. §103(a) as being unpatentable over United States Patent No. 5,884,009 to Okase; and rejected Claim 13 under 35 U.S.C. §103(a) as being unpatentable over Okase in view of U.S. Patent Number 6,817,377 to Reimer et al. (Reimer).

Applicants respectfully traverse the rejections for at least the following reason(s).

Claim 1 recites a film forming apparatus including, among other features, a supply port communicated from the gas-mixing chamber to the shower head to thereby supply the gas mixture that is disposed above the shower head and on a diametrical extension line of the shower head, the supply port being so arranged and constructed that the gas mixture supplied from the gas-mixing chamber flows from a peripheral exterior on the top face of the shower head toward a central portion along the top face thereof. See figures 3-4 of the application.

In other words, the gas mixture from the gas supply port flows from a peripheral exterior on the top face of the shower head toward a central portion along the top face thereof. As such, when a plurality of gas injection holes are formed at a certain pitch at the same diameter, the pressure of the gas mixture on the peripheral side of the shower head will substantially be the same as the gas pressure at the gas supply port. Therefore, a substantial amount of gas mixture will be injected toward the substrate (in this case, periphery of the substrate) on the substrate stage through the gas injection holes. Moreover, while the gas mixture flows toward the central portion of the shower head, the gas pressure of the gas mixture lowers and, thus, the amount of gas mixture to be injected toward the substrate on the substrate stage through the gas injection holes becomes smaller.

The claimed invention includes a structural arrangement wherein the exhaust gas inside a space defined by the shower head and the top surface of the stage is discharged through the clearance between the side wall of the film forming chamber and the stage. Therefore, when the exhaust gas flows from the center of the substrate toward the outside thereof on the top of the substrate, the amount of the exhaust gas which is introduced into the space and is discharged will increase.

As a result, the claimed invention facilitates and ensures that the supply of the gas mixture to be used in the predetermined processing is substantially uniform over the entire surface of the substrate while using a relatively simple structure to accomplish same. Thus, the uniformity of the thickness and composition of the film to be formed on the substrate surface is improved.

In Okase, the upper space between the disks 7a and 7b and the lower space between the disks 7b and 7c have predetermined distances in the diametrical direction of the disks 7a — 7c, and are divided into three zones by partition members, which are disposed to cross at right angles to the disks 7a — 7c. Each zone has a gas supply pipe 75a-75c connected thereto. The process gas supplied to each zone is supplied to the substrate through the gas supply holes 73b formed in the lowermost disk 7c. The amount of gas flow to be supplied to the substrate is made to be substantially uniform relative to the substrate by changing the number of supply holes 73b formed in each of the zones, the diameter of the supply holes 73b, the pitch between the supply holes 73b, and the like.

By using the above-described structural arrangement, Okase suffers from a drawback in that the piping of the gas supply pipes becomes complicated as does the structural configuration of the apparatus.

In addition, the work associated with forming, by optimizing the number, diameter, and pitch, of the supply holes in each zone of Okase is also complicated.

In view of the above, Applicants respectfully submit that Okase fails to teach or otherwise suggest a supply port communicated from a gas-mixing chamber to a shower head to supply a gas mixture, wherein the supply port is disposed above the shower head and on a diametrical extension line of the shower head, and wherein the supply port is arranged and constructed such that the gas mixture supplied from the gas-mixing chamber flows from a peripheral exterior on the top face of the shower head toward a central portion along the top face thereof.

Contrary to Okase, the claimed invention, because of the above-discussed recited structural features, renders the piping for each zone, which is required in Okase, needless, thereby resulting in an apparatus with an overall simpler structure.

In addition, the disk 7c in Okase, which corresponds to the shower head of the claimed invention, is divided into three zones. The amount of gas to be supplied to the substrate is changed by varying, for each zone, the diameter of the supply holes 73b, and the pitch between the supply holes 73b, thereby providing a structural arrangement that provides a substantially uniform supply of gas to the substrate. Accordingly, Applicants respectfully submit that Okase does not provide any suggestion or motivation to combine the structure used for supplying the gas mixture to the shower head and the structure used for discharging the exhaust gas in the space defined by the shower head 25 and the top surface of the stage 3, so as to uniformly supply the gas mixture to the entire surface of the substrate.

In view of the above, Applicants respectfully submit that Claim 1 is not rendered obvious by Okase and should therefore be deemed allowable.

Reimer does not cure or otherwise address the above-described drawbacks and deficiencies of Okase. As such, Claim 1 is not rendered obvious in view of the teachings of Okase and Reimer, either alone or in any combination thereof, and should be deemed allowable.

Claims 3-6, 8-11 and 13 depend from Claim 1. It is respectfully submitted that these dependent claims be deemed allowable for at least the same reasons Claim 1 is allowable, as well as for the additional subject matter recited therein.

Withdrawal of the rejections is respectfully requested.

Conclusion

Prompt and favorable examination on the merits is respectfully requested.

Should the Examiner believe anything further is desirable in order to place this application in better condition for allowance, the Examiner is requested to contact the undersigned at the telephone number listed below.

In the event this paper is not considered to be timely filed, the Applicants respectfully petition for an appropriate extension of time. Any fees for such an extension, together with any additional fees that may be due with respect to this paper, may be charged to counsel's Deposit Account No. 01-2300, **referencing docket number 026390.00009.**

Respectfully submitted,
ARENT FOX LLP

A handwritten signature in black ink, appearing to read 'Murat Ozgu', is written over the printed name.

Murat Ozgu
Attorney for Applicants
Registration No. 44,275

Customer No. 004372

ARENT FOX LLP

1050 Connecticut Avenue, NW, Suite 400
Washington, DC 20036-5339
Telephone: (202) 857-6000

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